

WHAT IS CLAIMED IS:

1. A plasma surface treatment system for irradiating a surface of a substrate to be treated with a nitrogen plasma excited by a high-frequency electric field to introduce nitrogen into said surface of said substrate, wherein

said system comprises a pulse modulator for pulse modulation of said high-frequency electric field.

2. A plasma surface treatment system as set forth in claim 1, wherein

said pulse modulator is a pulse modulator capable of controlling the high-frequency electric field application time at the time of pulse modulation of said high-frequency electric field.

3. A plasma surface treatment system as set forth in claim 1, wherein

said pulse modulator is a pulse modulator capable of controlling the high-frequency electric field stop time at the time of pulse modulation of said high-frequency electric field.

4. A plasma surface treatment system as set forth in claim 1, wherein

an electrode having apertures for mitigating vacuum ultraviolet rays is provided between said nitrogen plasma

excited by said high-frequency electric field and said substrate to be treated.

5. A plasma surface treatment method for irradiating a surface of a substrate to be treated with a nitrogen plasma excited by a high-frequency electric field to introduce nitrogen into said surface of said substrate, wherein

a high-frequency electric field undergoing pulse modulation is used as said high-frequency electric field.

6. A plasma surface treatment method as set forth in claim 5, wherein

the high-frequency electric field application time is controlled at the time of pulse modulation of said high-frequency electric field.

7. A plasma surface treatment method as set forth in claim 5, wherein

the high-frequency electric field stop time is controlled at the time of pulse modulation of said high-frequency electric field.

8. A plasma surface treatment method as set forth in claim 5, wherein

nitrogen atomic and molecular ions accelerated from said nitrogen plasma excited by said high-frequency electric field are implanted into said surface of said

substrate to be treated through an electrode having apertures.

9. A plasma surface treatment method as set forth in claim 5, wherein

the discharge sustention time at the time of pulse modulation of said high-frequency electric field is in the range of from 5 to 50 μ sec.

10. A plasma surface treatment method as set forth in claim 5, wherein

the duty ratio at the time of pulse modulation of said high-frequency electric field is in the range of from 5 to 50%.